

## 2 IMPACT AREAS NOT REQUIRING FURTHER ANALYSIS

Without further analysis, the potential impacts of new and modified projects and modifications to ongoing operations are judged to be minimal and within the bounds of the 1992 EIS/EIR (DOE 1992) in the following impact areas: air quality, noise, water quality, ecology (vegetation, fish and wildlife), hazardous materials, cultural resources, land use, transportation, socioeconomics, and miscellaneous areas. These impact areas met the screening criteria described in Section 1.3. For each of these impact areas, the 1992 EIS/EIR remains an adequate description of potential LLNL sitewide impacts for the years 1998 to 2002, and no supplementation of the 1992 EIS/EIR is needed.<sup>1</sup>

The reasons for eliminating these impact areas from detailed analysis are discussed below. The following subsections first describe the environmental conditions and impacts evaluated in the 1992 EIS/EIR for each of these impact areas. Next, any new information on impacts of operations and site conditions related to events during the years 1992 to 1997 is presented. Then, the relevant activity level or direct or indirect release terms associated with new and modified proposals and changed circumstances for the period 1998 to 2002 are described, including the potential consequences of new and proposed actions. These impacts are then compared with the consequences projected in 1992.

### 2.1 SOCIOECONOMICS

The socioeconomic environment of LLNL, including employment, population, housing, economic factors, and community services, as described in the 1992 EIS/EIR (DOE 1992), was based on an expectation for continued growth in the LLNL workforce. Employment was assumed to grow by 20% from 1992 to 2002, increasing the Livermore site workforce by about 2,000 and the Site 300 workforce by about 50. The 1992 EIS/EIR concluded that these increases would have a beneficial impact on employment in the two affected counties, increasing housing demand and employment income and expenditures in the region. The region of influence included Alameda and San Joaquin Counties, particularly the City of Livermore (near the Livermore site) and the City of Tracy (near Site 300).

Since publication of the 1992 EIS/EIR, however, employment at the Livermore site has decreased from a peak of about 11,200 workers in 1989 (DOE 1992) to 8,718 in 1996. From 1992 to 1996, Site 300 employment, on the other hand, grew from 200 to 247 workers (UC 1997).

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<sup>1</sup> Sections 3-9 contain more detailed analyses for impact areas that did not pass the screening criteria described in Section 1.3, thus requiring further analysis.

New and modified projects and modifications in site operations that are likely to be implemented at LLNL through the year 2002 may not completely reverse the trend of a gradually declining workforce at LLNL. For the site as a whole, current employment is expected to remain stable. During the same period, payroll is also expected to remain stable. Variations in employment and payroll should be very small compared with expected increases in the regional civilian labor force (890,000) and annual personal income (\$101,400 million) in the LLNL region between 1995 and 2005 (DOE 1996b). Because the possible variations in LLNL workforce and payroll are very small compared with expected regional economic growth, a change from an increase in workers (1992 EIS/EIR) to a stable workforce would have little influence on regional socioeconomic trends. Thus, supplementation of the EIS/EIR with respect to socioeconomics is not needed.

#### Socioeconomics

- ♦ 1992 EIS/EIR: Socioeconomic impacts were assessed on the basis of an assumed 20% increase in employment from the years 1992 to 2002, potentially increasing the Livermore workforce by 2,000 to 13,200 and the Site 300 workforce by 50 to 250.
- ♦ 1992–1997: By 1996, employment at the LLNL site declined to 8,718, and employment at Site 300 increased by 47 to 247.
- ♦ 1998–2002: Employment and payroll are expected to remain stable. Any variations in LLNL employment and payroll would be very small compared with projected increases from 1995–2005 in employment (890,000) and annual personal income (\$101,400 million) in this strong economic region. Supplementation of the EIS/EIR for socioeconomics is not needed.

## 2.2 AIR QUALITY

### 2.2.1 Criteria Pollutants

The 1992 EIS/EIR air quality evaluation projected minor increases in emissions of criteria air pollutants, assuming a 9% increase in LLNL point source emissions (on the basis of increase in LLNL facility floor space) and a 20% increase in LLNL mobile source emissions (on the basis of projections of the number of employees and assuming that the increase in vehicle traffic to, from, and on the site would be proportional to the increase in workforce). Only projected increases in emissions of volatile organic compounds (VOCs; ozone precursors) and PM<sub>10</sub> (particulate matter with aerodynamic particle diameter equal to or less than 10 µm) were considered significant in the EIS/EIR. Even though increases in ambient ozone and PM<sub>10</sub> concentrations due to LLNL operations were projected to be small, they were considered in the 1992 EIS/EIR to be significant because the area was classed in the nonattainment category for those pollutants (i.e., exceeded air quality standards).

After 1992, neither building square footage nor employment increased to the extent envisioned in the EIS/EIR. As described in Section 2.1, employment decreased at the Livermore site, and 70% of the expected increase in square footage of facilities was cancelled or delayed beyond the year 2002. At Site 300, 17% of the projected increase in square footage of facilities was likewise cancelled. Thus, during the period 1992 to 1997, both stationary and mobile criteria emissions at LLNL should have decreased relative to the 1992 assessment.

On July 18, 1997, the U.S. Environmental Agency (EPA) promulgated new federal air quality standards for ozone and for particulate matter with aerodynamic particle diameter equal to or less than  $2.5\ \mu\text{m}$  ( $\text{PM}_{2.5}$ ). Currently, the State of California does not have a separate  $\text{PM}_{2.5}$  standard; the primary federal standard is  $50\ \mu\text{g}/\text{m}^3$  (24-hour) and  $15\ \mu\text{g}/\text{m}^3$  (annual arithmetic mean). The State of California and local air quality boards are in the process of establishing monitoring stations by 1999 and will develop implementation plans by the middle of the next decade.

From 1998 to 2002, air emissions from mobile sources related to employment level at LLNL are expected to remain below the levels assumed for the 1992 EIS/EIR because employment will remain well below levels projected in that document.

From 1998 to 2002, air emissions from stationary sources will likely remain at or below the 1992 EIS/EIR projections. The square footage of new key facilities that will be operational by 2002 (Table 1.1) will remain at or below the value assessed in the 1992 EIS/EIR. The approximately 225,000  $\text{ft}^3$  of new key facilities or facility modifications included in Table 1.1 will not exceed the approximately 320,000  $\text{ft}^3$  of facilities covered in the 1992 EIS/EIR that were either cancelled or postponed beyond the year 2002.

The NIF, a facility of 445,000  $\text{ft}^3$ , will be under construction from now through 2002. The impacts of  $\text{PM}_{10}$  releases from construction of NIF have been assessed in Appendix I of the *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (SSM PEIS) (DOE 1996b). On some days during the month when the NIF site is being cleared, fugitive dust emissions may moderately impact air quality at or near the

#### Air Quality: Criteria Pollutants

- ♦ 1992 EIS/EIR: Air quality impacts were projected to increase in proportion to assumed increases in new facility space and employment.
- ♦ 1992–1997: Mobile sources likely decreased in proportion to decreased site employment. Emissions from stationary sources likely did not reach predicted levels because of facility cancellation or postponement. New federal primary standards for  $\text{PM}_{2.5}$  and ozone were released in 1997.
- ♦ 1998–2002: Emissions resulting from new and proposed projects and anticipated workforce levels are expected to remain within the 1992 EIS/EIR projections. California regulations already encompass protective intent of new regulations. Supplementation of the 1992 EIS/EIR for criteria pollutants is not needed at this time.

Livermore site boundary. This assessment is consistent with that in the 1992 EIS/EIR, which similarly predicted short-term impacts from fugitive dust emissions due to construction activities. This impact was judged significant in the 1992 EIS/EIR. The construction of NIF is consistent with this assessment.

Because employment and operational square footage of facilities would remain at or within the EIS/EIR bounds, and because NIF construction would have impacts consistent with those assessed in the 1992 EIS/EIR, no supplementation of the EIS/EIR is needed.

### 2.2.2 Other Releases to the Air

As reported in the 1992 EIS/EIR, the public exposure cancer risk for the surrounding community from releases to the air of hazardous materials at the Livermore site was assessed as being less than 1 in 1 million. The noncarcinogenic risk (expressed as a hazard index) from these same chemicals was less than 1. The maximum carcinogenic and noncarcinogenic risks for the Livermore site were below the level of concern established by the California Air Pollution Control Officers Association. For Site 300, the emission of hazardous air contaminants, controlled under the Air Toxics “Hot Spots” Information and Assessment Act (AB 2589), estimated from open burning source sampling at the “Iron Horse” was small and did not require a risk assessment by the San Joaquin Valley Unified Air Pollution Control District (McVaigh 1995). The 1992 EIS/EIR assumed that the future increase in other air pollutants above baselines would be comparable to the percentage increase in the square footage of facilities (9%). The EIS/EIR concluded that the public and workers would be exposed to approximately the same level of risks from hazardous and toxic substances as they would under the 1992 baseline conditions. The basis given for this conclusion was that projected increases in use of hazardous and toxic substances and associated risk would be offset by improvements in facility administration and control. The EIS/EIR stated that releases would remain below the California Air Resources Board threshold level and were, therefore, considered less than significant.

#### Air Quality: Other Releases

- ◆ 1992 EIS/EIR: Releases of air pollutants other than criteria pollutants would increase by 9%, on the basis of assumed increases in facility square footage, but would remain below threshold levels.
- ◆ 1992–1997: Releases of these other air pollutants remained within 1992 projections, except for formaldehyde in 1994. The federal government now requires that releases of Freon-113 be reported.
- ◆ 1998–2002: New and proposed facilities have releases that do not pose unacceptable health risks. Because square footage of new facilities will not exceed levels predicted in 1992, releases of other air pollutants are also not expected to exceed 1992 predictions. Supplementation of the EIS/EIR for other pollutants is not needed at this time.

Since the 1992 EIS/EIR was issued, formaldehyde emissions exceeded 1992 baseline values only in 1994. Current emissions are well within (14% of) 1992 baseline values (UC 1997). Since 1992, the EPA has developed procedures for determining reportable releases of noncriteria air pollutants. For LLNL, the only chemicals required to be reported on the EPA Toxic Chemical Release Inventory form are 1,1,2-trichloroethane and 1,2,2-trifluoroethane (Freon-113). All other releases are below reportable limits. This is a reduction in the number of reportable releases since 1992.

For the period 1998 to 2002, the square footage of facilities listed in Table 1.1 that will be operational by 2002 will remain at or below the square footage assessed in the 1992 EIS/EIR. Approximately 225,000 ft<sup>3</sup> of new facilities or facility modifications will not make up for the approximately 320,000 ft<sup>3</sup> of facilities covered in the 1992 EIS/EIR that were either cancelled or postponed beyond the year 2002. To the extent that emissions of other air pollutants are a function of square footage of facilities, impacts should remain within the bounds of the 1992 EIS/EIR.

Modeling analyses in the EAs related to the EWTF (DOE 1995a) and DWTF (DOE 1996a) indicated that operations of those facilities would not pose unacceptable chemical health risks to site personnel or the public and would be below state-accepted exposure levels. No impacts from hazardous chemicals are anticipated from routine NIF or CFF operations (DOE 1996b). Releases of noncriteria pollutants, hazardous air pollutants, and toxic chemicals are expected to be less than those anticipated in the 1992 EIS/EIR. Thus, no supplementation of the 1992 EIS/EIR for these releases is needed.

## 2.3 NOISE

The 1992 EIS/EIR identified the principal sources of noise at LLNL as vehicle traffic; mechanical equipment; building construction, repair, and demolition; research and testing involving high explosives at Site 300; and use of the firearms ranges at Site 300. Outdoor testing of high explosives was described as the main source of off-site noise at rural and remote locations near Site 300. The 1992 EIS/EIR projected a decrease in noise because of an expected decrease in the number of tests of high explosives at Site 300.

Since 1992, no major new noise sources have been added to LLNL, either at the main site or at Site 300. Testing of high explosives at Site 300 has remained stable. Noise generated by worker vehicular traffic may have decreased in Livermore and may have increased near Site 300 because of workforce decreases at the former and increases at the latter. The increase in the workforce at Site 300 is within the projections contained in the 1992 EIS/EIR. Since 1992, local noise guidelines and standards have been implemented in the land use plans of communities adjacent to the Livermore site and Site 300: the City of Livermore (1996a-b), the Alameda County's East County Region (County of Alameda 1994), the City of Tracy (1993), and the County of San Joaquin (1992). These plans and associated noise elements are generally

consistent with previously adopted guidelines and standards (UC 1997).

New and proposed projects likely to be implemented at LLNL include the CFF at Site 300, which will provide containment for some explosive tests presently conducted in the open. This facility may be in operation before the year 2002. If so, this and other efficiencies and improvements in facilities used for high-explosives testing could reduce impacts from noise sources at Site 300 over the long term. Noise from worker vehicular traffic at both sites is expected to remain stable as a result of stable employment (see Section 2.1). Construction of the NIF and other facilities may at times cause temporary increases in local truck traffic at the Livermore site. Intermittent construction-related noise was included in the 1992 EIS/EIR analysis. Changes in worker-related and construction-related noise are considered to be within the bounds of the 1992 EIS/EIR; therefore, no supplementation of the EIS/EIR is needed with respect to noise impacts.

#### Noise

- ◆ 1992 EIS/EIR: Noise sources, including high-explosive testing at Site 300, were projected to decline in proportion to projected decreases in testing.
- ◆ 1992–1997: Traffic noise levels declined at Livermore and increased at Site 300 because of changes in sizes of workforces. Noise from testing at Site 300 remained stable and within historical limits. Noise elements of new local and county plans remained consistent with those described in the EIS/EIR.
- ◆ 1998–2002: Off-site noise from high-explosives testing at Site 300 may decline when some tests are moved indoors to the CFF. Noise from worker traffic is expected to be stable, but construction traffic could increase noise for short periods. These impacts are within the bounds of the 1992 EIS/EIR. Supplementation of the EIS/EIR for noise is not needed.

## 2.4 WATER QUALITY

The 1992 EIS/EIR concluded that continued operation of LLNL would result in minor and insignificant impacts to surface and groundwater quality. New facilities were projected to create slightly increased stormwater runoff and very slightly decreased groundwater recharge.

Annual monitoring data collected since 1992 show no substantial changes to surface water quality (LLNL 1993, 1994a, 1995a, 1997d). Groundwater quality has been improved by ongoing remediation activities (UC 1997). Groundwater investigations indicate that buried PCB-containing capacitors discovered at the NIF construction site did not result in measurable groundwater contamination (DOE 1998a).

New and proposed activities at LLNL through the year 2002 should not result in increases in stormwater runoff because the increase in facility square footage would be comparable to that projected in the 1992 EIS/EIR. NIF construction would not impact water quality. Ongoing and proposed remediation activities through the year 2002 would continue to improve groundwater quality. No supplementation of the EIS/EIR with respect to water quality is needed.

## 2.5 ECOLOGY (VEGETATION, FISH, AND WILDLIFE)

The 1992 EIS/EIR assessed the impacts on biotic resources, other than sensitive species (see Section 3), on the basis of projected increases in building square footage for the Livermore site (9% increase) and Site 300 (6% increase). Habitats affected at the Livermore site were described as grasslands composed of introduced species, lawns, and weedy areas. Wildlife species at the Livermore site, other than those of special status (see Section 3), include species typical of developed suburban areas and marginal habitats. Site 300, which is largely undeveloped, contains a high diversity of vegetation and wildlife, including components associated with seeps and springs, grasslands of native and introduced species, and scattered scrub and woodland habitats. The 1992 EIS/EIR identified disturbance from construction as the predominant impact on vegetation and wildlife. In addition, controlled burning at Site 300 to protect against accidental grass fires was assumed to continue.

Since publication of the 1992 EIS/EIR, no substantial changes have occurred in the vegetation of either the Livermore site or Site 300. Anticipated growth in building square footage has not been realized to the extent originally predicted (see

### Water Quality

- ♦ 1992 EIS/EIR: Minor and insignificant impacts to surface water and groundwater quality were projected.
- ♦ 1992–1997: No changes in surface water quality have been noted. Groundwater quality has improved as a result of remediation.
- ♦ 1998–2002: Changes in stormwater runoff for this period are expected to be comparable to those assessed in the 1992 EIS/EIR. Continued improvement in groundwater quality as a result of remediation is expected. Supplementation of the EIS/EIR for water quality is not needed at this time.

### Ecology

- ♦ 1992 EIS/EIR: Growth of facilities at the Livermore site (9%) and Site 300 (6%) was expected to proportionately disturb vegetation and wildlife.
- ♦ 1992–1997: No changes in vegetation or wildlife were noted; surveys identified additional species and habitats, providing for improved protection and mitigation.
- ♦ 1998–2002: Construction of NIF would not raise site development above levels described in the 1992 EIS/EIR. This disturbance would impact low-quality habitats, and the ecological character of the Livermore site would remain as described in the 1992 EIS/EIR. Supplementation of the EIS/EIR in the area of ecology is not needed at this time.



Section 2.2), and controlled burning of Site 300 continues. Biotic surveys conducted at both locations since 1992 have provided additional information on plant communities and their distribution, a potential environmental benefit that assists in application of protection and mitigation measures when necessary. Impacts to vegetation and wildlife from 1992 to 1997 are presumed to have been less than predicted in the 1992 EIS/EIR because the growth of site facilities was less than assumed (see Section 2.2).

New and proposed projects at LLNL include the NIF (DOE 1996b), which would disturb 3% of the Livermore site area. However, this and other site development would affect low-quality habitats, would not change the character of vegetation or wildlife, and would remain as described in the 1992 EIS/EIR. No supplementation of the EIS/EIR with respect to vegetation or wildlife is needed at this time.

## 2.6 HAZARDOUS MATERIALS

To assess potential impacts from accidental releases of toxic chemicals, the 1992 EIS/EIR evaluated chemical accident scenarios using the Complex Hazardous Release Model (CHARM, version 6.1<sup>2</sup>). The six chemicals evaluated were chlorine gas, sulfuric acid mist, hydrogen chloride gas, hydrogen cyanide gas, ammonia gas, and arsine. Results of the analyses indicated that three of the accidents considered would produce off-site hazardous material air concentrations in excess of Emergency Response Planning Guide (ERPG)-2 levels.<sup>3</sup> A release of 100 lb of chlorine during a handling accident at Building 518 was considered to be the bounding accident scenario. Airborne concentrations of chlorine from such an accident might exceed ERPG-2 levels at distances of up to 4.1 km from the site boundary.

Since the 1992 EIS/EIR was published, the safety analysis reports (SARs) have been updated for a number of facilities, including Building 332 (the Plutonium Facility) and Building 331 (the Tritium Facility). In addition, an SAR was prepared for the proposed NIF. Preliminary hazard analyses were updated for Building 197 (the Physics and Space Technology

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<sup>2</sup> The current version of CHARM is 8.0, which incorporates major revisions to the model's source terms.

<sup>3</sup> The various ERPG levels are defined as follows:

ERPG-1: The maximum airborne concentration above which it is believed nearly all individuals exposed for up to 1 hour could experience some mild transient adverse health effects or detect a clearly defined objectionable odor.

ERPG-2: The maximum airborne concentration above which it is believed nearly all individuals exposed for up to 1 hour could experience or develop irreversible or other serious health effects or symptoms that could impair their ability to take protective action.

ERPG-3: The maximum airborne concentration above which it is believed nearly all individuals exposed for up to 1 hour could experience or develop life-threatening health effects.



Semiconductor Research and Development Facility) and Building 298 (the Inertial Confinement Fusion Target Development Facility). In addition, EAs were prepared for the EWSF, DWTF, and EWTF (DOE 1995a, 1996a, 1996c). Accidents evaluated for these facilities included operator error, spills, airplane crashes, seismic events, and explosions. The only chemical accident scenario that would exceed an ERPG-2 concentration beyond the LLNL boundary (0.04 km or 400 m away) would be a chemical spill at the DWTF. This scenario presents less risk to the public than the bounding accident evaluated in the EIS/EIR.

#### Accidental Release of Hazardous Materials

- ◆ 1992 EIS/EIR: A chlorine-handling accident might result in ERPG-2 exceedances at distances of up to 4.1 km from LLNL.
- ◆ 1992–1997: Updated safety analysis reports (SARs) for new and proposed facilities indicated releases might exceed ERPG-2 levels 0.4 km (400 m) away from the site boundary, which is a reduction in the risk to the public that was identified in the EIS/EIR.
- ◆ 1997–2002: Expected risks from accidental releases of hazardous chemicals would be within the bounds of the EIS/EIR and subsequent SARs. Supplementation of the EIS/EIR for accidental release of hazardous materials is not needed.

On June 20, 1996, the EPA promulgated regulations for prevention of accidental releases of hazardous substances under Section 112(h) of the Clean Air Act Amendments. Facilities with chemical inventories exceeding specified “threshold quantities” at “covered processes” are required to prepare a Risk Management Plan (RMP). Review of current chemical inventories at LLNL in the ChemTrack database confirms that none of the chemicals listed in 40 CFR 68.130 are present in quantities that require the preparation of an RMP for LLNL. In fact, “listed” chemical quantities at a process (e.g., building) or connected process are less than 20% (i.e., hydrofluoric acid) of the regulated chemicals threshold quantity that would trigger the preparation of an RMP. Most of the listed chemicals in the ChemTrack database are in very small quantities (much less than 1% of the chemical-specific threshold quantity).

For the period 1998 to 2002, no new facilities are proposed that are anticipated to pose risks from releases of hazardous materials greater than those identified in the 1992 EIS/EIR. Therefore, no supplementation of the EIS/EIR is needed at this time for accidental hazardous materials releases.

## 2.7 CULTURAL RESOURCES

The 1992 EIS/EIR addressed impacts to prehistoric and historic cultural resources. At that time, no prehistoric cultural resources were known to occur at the Livermore site, and an evaluation of historical cultural resources had just been completed. At Site 300, no prehistoric cultural resources were known from the potentially affected areas. The 1992 EIS/EIR concluded for both sites that impacts to prehistoric cultural resources were unlikely and that impacts to

important historical resources would occur, but would be at less than significant levels. Because previously unknown prehistoric cultural resources might be encountered, mitigation measures were specified for educating workers and contractors, notifying appropriate site organizations, and consulting with state and federal authorities.

In 1994, consultation was begun with the California State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) to develop a Programmatic Agreement with the DOE Oakland Operations Office. This agreement, which is in draft form, would also guide in the development of a cultural resources management plan and program for LLNL.

#### **Cultural Resources**

- ◆ 1992 EIS/EIR: Impacts to prehistoric cultural resources would be unlikely, and impacts to historic resources would be less than significant. Measures for protection of unknown resources were specified.
- ◆ 1992–1997: No new prehistoric or historic cultural resources were identified. A Draft Programmatic Agreement between DOE and the SHPO and ACHP regarding cultural resources management was developed and is in final review.
- ◆ 1998–2002: Impacts of future activities are expected to be as projected in the 1992 EIS/EIR. Supplementation of the EIS/EIR for cultural resources is not needed.

During the period 1992 to 1997, no new prehistoric cultural resources of significance were discovered at either the Livermore site or Site 300. Therefore, construction activities for projects listed in Table 1.1 for the years 1998 to 2002 are not expected to impact such resources. Impacts to historic structures could occur during building and site upgrades; however, these resources would be protected pursuant to the measures identified in the 1992 EIS/EIR. Any previously unknown prehistoric cultural resources discovered during excavation would also be protected pursuant to the measures identified in the 1992 EIS/EIR. These potential impacts are as described in the 1992 EIS/EIR. For these reasons, no supplement of the EIS/EIR for prehistoric and historic resources is needed.

## **2.8 LAND USE**

LLNL has been operated as a federal research and development laboratory for more than 40 years. Access to the site is limited by a barbed-wire security fence and buffer zone at the Livermore site and by entrance gates at Site 300. The 1992 EIS/EIR addressed the uses of LLNL, identified the consistency of LLNL use with then-existing land use plans, and concluded that continued operation of LLNL would not change the use of the site nor create any new land use impacts. It was acknowledged, however, that growth of the surrounding community was placing suburban and industrial development closer to the site boundaries.

During the period 1992 to 1997, county and local government units developed new land use plans and zoning regulations (City of Livermore 1996a-b; City of Tracy 1993; County of Alameda 1992, 1994; County of San Joaquin 1992, 1996). Where applicable, these plans acknowledge the continued use of the LLNL site for federal research and development. The City of Tracy has designated an area of very-low-density housing near the eastern and northern boundaries of Site 300. Plans in 1997 limited development from the City of Tracy to no closer than 1.5 mi from the Site 300 boundary. It is uncertain whether this area near the Site 300 boundary would be developed within the next 5 years.

#### Land Use

- ◆ 1992 EIS/EIR: Use of LLNL as a federal research and development facility was expected to remain consistent with existing land use plans and guidelines; suburban and industrial development was expected to continue to increase near LLNL.
- ◆ 1992–1997: New land use plans and zoning regulations were issued by county and local governments; use of LLNL for research and development remained consistent with those plans.
- ◆ 1998–2002: New and proposed projects should not change the nature of the use of the LLNL site; development will continue to increase near LLNL boundaries. Supplementation of the EIS/EIR for land use is not needed.

New and proposed projects at LLNL should not change the designated use of the LLNL site. New land use plans take into account the continued use of both the Livermore site and Site 300 for federal research and development. New commercial and residential development will continue to increase near the LLNL site boundaries. These conditions are consistent with those analyzed in the 1992 EIS/EIR; therefore, no supplementation of the EIS/EIR with respect to land use is needed at this time.

## 2.9 TRANSPORTATION

### 2.9.1 Employee Vehicles

The 1992 EIS/EIR evaluated the contribution of the LLNL workforce to peak-flow traffic congestion in the surrounding community. Both LLNL and the local community had plans to upgrade roadways and improve traffic conditions. These actions included local road widening, resurfacing, installation of traffic signals, and

#### Transportation: Employee Vehicles

- ◆ 1992 EIS/EIR: Transportation system upgrades were planned. An increasing site workforce was expected to increase LLNL's contribution to peak-flow traffic congestion in the surrounding community.
- ◆ 1992–1997: Transportation system upgrades at the site were completed; the declining workforce decreased LLNL's contribution to peak traffic flow in the surrounding community.
- ◆ 1998–2002: Employment would remain essentially stable, resulting in a stabilizing site contribution to traffic congestion and peak traffic flow in the surrounding community. Supplementation of the EIS/EIR for transportation is not needed at this time.

improvement of LLNL site entrances. Gradual improvement was expected to continue through 2002. Public transportation improvements in the region included an extension of the Bay Area Rapid Transit line to the nearby communities of Dublin and Pleasanton. The transportation analysis in the EIS/EIR was based on the assumption that the LLNL workforce would increase by 20% within a 10-year period.

As discussed in Section 2.1, employment from 1992 to 1997 actually declined. This meant that although LLNL continued to be a major contributor to traffic flow at peak periods, the effect from 1992 to 1997 was less than anticipated.

From 1998 to 2002, the size of the LLNL workforce is expected to remain stable. This trend will result in continuation of reduced traffic congestion from LLNL workers and a stable contribution by LLNL workers to peak traffic flows in the community. The transportation impacts of LLNL will remain within the bounds of the 1992 EIS/EIR. No supplementation of the EIS/EIR with respect to employee vehicle impacts on transportation is needed at this time.

## 2.9.2 Material and Waste Transportation

The 1992 EIS/EIR concluded that increased use of hazardous or radioactive materials would result in an increased number of shipments of such materials to and from LLNL, but that this increase would not cause a significant impact. This conclusion was based on an expected 9% increase in facility area and planned reduction in the plutonium administrative limit. The 1992 EIS/EIR also acknowledged that packaging requirements of the U.S. Department of Transportation (DOT) and the California Department of Transportation (CDOT) for shipping hazardous and radioactive materials would ensure that no standards of significance were violated.

For the period 1992 to 1997, facility square footage did not increase to the extent expected in 1992 because of project cancellation or delays (see Section 2.2). In addition, only partial quantities of excess plutonium inventory were shipped off-site (see Section 1.5.2), and quantities of chemicals at LLNL declined by over 50% (DOE 1997b). These factors imply reduced shipment of these materials. During this period, low-level waste was certified for

### Transportation: Materials and Wastes

- ◆ 1992 EIS/EIR: Increase in shipments of materials would have less than significant impacts. DOT and CDOT regulations would ensure that no standards of significance were violated.
- ◆ 1992–1997: Some factors related to shipment declined, others increased. Analyses of transportation of radiological materials indicate very low risk to workers and the public.
- ◆ 1998–2002: Shipment of wastes are expected to decline. Shipment of radiological materials may increase, but, because of the DOT and CDOT requirements, with no increase in risk to workers or the public. Impacts would be substantially similar to those analyzed in the 1992 EIS/EIR. No supplementation of the 1992 EIS/EIR for transportation of materials and wastes is needed.

shipment off-site, which implies shipment. Several extensive analyses of the shipment of radiological materials demonstrated that such shipments pose very low risks to the public. These studies included the SSM PEIS (DOE 1996b), the Storage and Disposition PEIS (DOE 1996d), and the WM PEIS (DOE 1997b).

A hazard assessment of transportation accidents is being prepared in support of emergency planning at LLNL (Hildum 1999). Container accidents involving spills for on-site transport of chemicals controlled under SARA Title III (40 CFR 355) were analyzed with the Emergency Prediction Information model (EPIcode). The LLNL ChemTrack database, along with a screening procedure using modeling results and the 40 CFR 355 Threshold Planning Quantities, was used to identify maximum chemical transit quantities. This screening produced five chemicals with shipment quantities ranging from 110 lb (hydrogen fluoride) to 844 lb (sulfuric acid). The modeling results showed ERPG-2 hazard distance ranging from less than 30 m (sulfuric acid) to 850 m (ammonia). The maximum impact from the ammonia spill was less than or equal to the impact from the bounding accident assessed in the 1992 EIS/EIR.

For the period 1998 to 2002, changes in administrative limits (see Section 6) for some radioactive materials may increase shipment of these isotopes. Exposure of the public to chemical and radiological effects will be limited by packaging requirements of DOT and CDOT, as was discussed in the 1992 EIS/EIR analysis. Waste shipments are expected to decline from 1998 to 2002 because, on a whole, waste generation is expected to decline. Because the 1992 EIS/EIR assessment was based on optimistic projections of facility growth, chemical usage, and waste generation that should not be exceeded in the 1998 to 2002 period, it is judged that impacts from transportation of these materials will be within the bounds of the 1992 EIS/EIR. This assessment is supported by the above referenced PEISs that assessed the impacts of materials and waste shipment. No supplementation of the EIS/EIR with respect to transportation of materials or wastes is needed.

## **2.10 MISCELLANEOUS**

### **2.10.1 Occupational Protection**

The discussion of the 1992 EIS/EIR was reviewed regarding the status of the occupational protection program at LLNL in the areas of radiation protection and physical hazards, as discussed below:

- *Radiation Protection:* The total collective dose for occupational workers has decreased from 28.5 person-rem in 1990 to 15.1 person-rem in 1996 (LLNL 1998e). This reduction is in large part due to actions taken to reduce exposures to vault workers and reduction of work load at Building 332. An accidental exposure to curium-244 in the Waste Management Division during

1997 resulted in an estimated 15 to 30 rem committed effective dose equivalent (CEDE) to the individual. However, the general trend of reduced occupational exposures is expected to continue.

- *Physical Hazards:* In the 1992 EIS/EIR it was reported that there were 169 recordable injuries resulting in 4,081 lost or restricted activity days. In 1997, the numbers had increased to 534 cases and 4,422 lost workdays. A majority of this increase appears to be due to increases in cumulative trauma (e.g., carpal tunnel syndrome), from 15% in 1990 to 25% in 1997. In 1998, the number of recordable cases had decreased to 476 (2,778 lost work days), but the portion of cumulative trauma cases had increased to 32% (Zahn 1999). This change in the rate of cumulative trauma cases is most likely due to increases in awareness of the syndrome and does not imply a reduction in the quality of the occupational protection program. Regardless, LLNL continues to take actions to reduce the occurrence of all physical injuries within the workforce.

In conclusion, LLNL continues to provide an adequate occupational protection program, and the 1992 EIS/EIR does not need supplementation in that area. In addition, radiation doses are not expected to increase significantly with the proposed higher administrative limits, because the amount of material in process and the amount of ongoing activities will not necessarily directly increase with the higher limits.

### **2.10.2 Environmental Spills**

The environment can become contaminated directly from accidental releases of liquids or from deposition of materials from passing airborne releases. Environmental contamination and spill response is regulated by various federal, state, and county organizations. LLNL has the required spill response plans, equipment, and personnel to respond to such events. Contamination would normally be rapidly contained and cleaned up to established standards, and the materials would be disposed of in accord with regulations for waste. In the unlikely event that the contamination is extensive, the remediation is also mandated and regulated and would be monitored by those regulatory bodies. Radioactive contamination levels of soil, vegetation, and water are monitored, and the public exposure is reflected in the public health assessments presented in the annual Environmental Reports. The public exposure and the pollution prevention and waste minimization programs are adequately addressed in the 1992 EIS/EIR.

### **2.10.3 Water Consumption**

The 1992 EIS/EIR estimated that domestic water usage in 1992 at the LLNL Livermore site was 239.7 million gallons and projected an increase to 264.8 million gallons by 2002 on the

basis of an assumed 9% growth of LLNL. The current projection of usage for 2002, including usage for those portions of the NIF and Terascale Simulation Facility (TSF) operations expected to be underway by that time, is 261.3 million gallons per year, which is substantially similar to the 1992 EIS/EIR projection (Zahn 1999).

#### **2.10.4 Electrical Energy Consumption**

The projected year 2002 annual power consumption, based on current LLNL plant engineering estimates, is 474.2 million kWh. This figure includes the addition of all new building loads, including those for the NIF and the TSF. Although the power consumption for 2002 is projected to exceed the amount forecasted in the 1992 EIS/EIR (376.5 million kWh), the impact would not be significant because the LLNL electrical infrastructure capacity exceeds peak demands by a large margin.



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